suggests that the nature of procedures used is totally one of discretion. The Commission should clarify that due process concerns may require a formal hearing under certain circumstances.

It is well established that the Due Process Clause of

E.   The Commission Should Permit the Settlement
     of Rate Cases

The Order states that "the regulatory structure
established by Section 623 of the Cable Act does not appear
to give cable operators and franchising authorities latitude
to settle rate cases."[33] Viacom, however, disagrees. While
certainly the benchmark rates and price-cap mechanism
established by the Act may not be undermined, the Commission
or local authority is afforded much decisional discretion in
the review of cost of service showings. Nothing in the Act
suggests that this discretion would not include the ability
to settle a rate case. Indeed, the availability of
settlements in this context would serve the public interest
as this option could significantly reduce the costs and time
of rate review for both the operator and the reviewing
authority. Accordingly, Viacom requests that the Commission
clarify that rate cases are subject to settlement so long as
the reviewing authority explains why it is in the public
interest to do so.

F.   Cable Operators Should Be Afforded Flexibility as
     to How to Return Excess Earnings to the Public

The Order provides that, in the event the reviewing
authority finds an operator's rates excessive, the operator

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[33]   Order at 85, n.337.

may be required to return any excess earnings to
subscribers.[34] Although the Order grants the reviewing
authority the ability to order refunds, it nevertheless
recognizes the administrative difficulties and unreasonable
costs potentially involved in fully crediting all affected
members of the public. Because of the operator's ever-
changing customer base, "[t]he expense associated with
identifying [and locating] the exact parties eligible for a
refund might well be disproportionately large in comparison
to the individual refunds themselves."[35]

Due to the excessive costs and burdens associated with
refunding overages to subscribers, Viacom submits that the
public interest would be served by affording cable operators
the flexibility to determine how best to handle this
process.[36] Because the size of the refund, the nature of
subscriber records, and the extent of customer turnover may
differ significantly from system to system, the process most
efficient for refund in one system may not be cost-effective
for another. The cable operator is in the best position to
determine which refund mechanism makes most sense.

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[34]   Id. at 95, 235.

[35]   Id. at 236-37; see also id. at 97, n.378.

[36]   In addition to issuing a refund or credit to the
particular subscribers who paid the overage, the Order also

Accordingly, so that cable operators are not forced to incur unnecessary and unrecoupable costs, the Commission should allow each operator the flexibility to determine the appropriate refund mechanism.

> G.   The Commission Should Clarify When the Offering of A La Carte Programming Constitutes an Evasion of the FCC Rules

Viacom additionally seeks clarification as to the ground rules for offering a la carte services. The Order states that the Commission will not regulate packaged offerings of otherwise exempt per-channel or per-program services so long as two essential conditions are met: (1) the price of the combined package does not exceed the sum of the individual charges for each component service, and (2) the operator continues to provide the component parts of the package to subscribers separately as a "realistic service choice."[37] However, the Order also notes its concern about attempts to evade rate regulation through the offering of a la carte services, and that "we retain the discretion to review such situations on a case-by-case basis."[38] Viacom seeks clarification as to what circumstances would constitute such an evasion.

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[37]   Order at 206-07.

[38]   Id. at 207, n.808.

V. CONCLUSION

For the foregoing reasons, Viacom urges the Commission to reconsider or clarify certain portions of its Order establishing rate regulations for cable operators. Implementation of the modifications suggested above will better accomplish the Commission's dual goals of ensuring availability of cable service to the public at affordable rates and maintaining sufficient incentives and cost recovery to permit cable operators to continue to expand and improve their service offerings.

Respectfully submitted,

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Regulatory Benchmarks for Cable Rates: A Review of the FCC Methodology

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I. Introduction

In the Cable Television Consumer Protection and Competition Act of 1992, Congress directed the FCC to develop and implement a regulatory strategy to ensure that all cable customers would receive the benefits of competition. To meet its oversight responsibilities with respect to the price of cable service, the Commission developed an econometric model of cable rates, which it used to develop: (1) a set of pricing benchmarks meant to capture systematic differences in the costs of providing cable services which would be accounted for in the pricing guidelines to be adhered to by system operators; and (2) estimates of the magnitude by which cable prices would be lowered by competition if it existed as defined in the Cable Act.

Under the Act, a cable system is assumed to be subject to effective competition within its franchise area if either of two conditions is satisfied: (1) The presence of at least two multi-channel television services in a franchise area, each serving a substantial fraction of the area's cable customers. (These situations are represented by cable overbuilds in the Commission's data set.); and (2) Cable penetration of less than thirty percent if a franchise area is served by a single cable operator.

Using its model to compare basic service rates charged by cable systems subject to statutorily defined competition with rates charged by systems not subject to such competition, the Commission found per channel prices to be approximately 10 percent lower for systems subject to competition. This finding presumes that the effects on pricing caused by direct head-to-head competition between cable companies and the different factors resulting in low penetration of cable systems not subject to head-to-head competition were assumed to be comparable in their effects on price.

That direct competition and other different factors which cause low penetration should be similar in their effects on cable prices cannot be demonstrated on theoretical grounds and can only be validated through empirical investigation. In a modified version of its original econometric model that separately examines the relationship between prices for basic service and low penetration and the different relationship between prices for services and head-to-head competition, the Commission found a much larger differential between (a) prices charged by non-competitive systems compared to prices charged by systems subject to competition by virtue of the presence of a second multi-channel distributor ("Overbuild Systems") than between (b) prices charged by non-competitive systems compared to prices charged by systems with less than 30 % penetration ("Low Penetration Systems"). Observing that low penetration may be "attributable to factors other than the presence of competing video distribution services,"[1] the Commission has asked for comment on whether only overbuild systems should be used to estimate competitive differentials.

In responding to the Commission's request for comment on this issue, we have found it necessary to consider the accuracy of the original analysis leading to a 10 percent competitive differential as well as the empirical methodology that produced that estimate. The intent of the Congress in writing the Act was that all cable subscribers enjoy the benefits of presumed competitive rates for cable service. Thus, with respect to the propriety of excluding Low Penetration Systems from the econometric model, the important question is not whether there are theoretical grounds for excluding them, but

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[1] ¶560, Report and Order and Further Notice of Proposed Rulemaking released by the Commission on May 3, 1993.

whether the benchmarks generated when they are included in the model are reasonable estimates of competitive rates.

In addition to promoting the Congressional intent of securing economic efficiency and consumer welfare via competitive prices, the benchmarks must promote equity across the marketplace, absent compelling reasons to the contrary. That is, the resulting prices should allow for systematic differences between markets--in particular, the benchmark prices should reflect cost factors that are beyond the control of the cable operator.[2]

In Section II of this review, we replicate the FCC's model ("Model I") and estimates. Then we analyze the FCC's proposed methodology whereby Overbuild Systems would be separated from Low Penetration Systems, and we also analyzed the data set employed to generate the proposed benchmarks and estimates of competitive differentials. This analysis is then further extended in Section III wherein we conclude that the Commission's tentative finding of a 28 percent competitive effect is too large due to significant shortcomings in the FCC's underlying data and econometric model. Omitted variables that are highly correlated with the presence of overbuild competition are perhaps the most important source of bias which we found.[3]

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[2]Of course, there are other important criteria for evaluating the merit of alternative benchmark methodologies. In particular, one must consider the inevitable costs of regulation and how they are affected by the adoption of alternative regulatory schemes. For example, one must consider the administrative burden, the cost of implementation, and the ability to monitor compliance. Allowance also must be made for potential economic distortions caused by cable operators who rationally will attempt to make the best of the new enironment by changing their behavior. For example, one consequence of the new price contraints might well be less high-quality programming resulting from cable system operators negotiating lower license fees paid to programmers in order to make up for revenue losses experienced by operators due to the service rate rollbacks. Such economic consequences should be part of the social calculus in evaluating the efficacy of alternative regulatory approaches.

[3]For theoretical reasons, we also suspect that the weighted average of prices for different tiers that is used as the dependent variable in the Commission's

In Section III we also examine a second data set that includes many of the critical variables missing in the FCC data set. Using this data set to augment work with the FCC data set, we find that including Low Penetration Systems in the Commission's original study actually roughly offsets the shortcomings of problems with the Commission's original data and methodology. We believe that the true effect of overbuild competition on cable prices is close to the FCC's original 10 percent estimate even without inclusion of the Low Penetration Systems. In Section IV, we describe the implications of the FCC's proposed benchmarks if they exclude the Low Penetration Systems. In Section V, we conclude by exploring the equity and efficiency implications of employing the original benchmarks and 10 % estimates of competitive effects and make some suggestions for improvement in those original benchmarks.

II. The Methodology

At the heart of the FCC's methodology is an econometric model relating a franchise's average basic revenue per subscriber on a per channel basis (in logarithms) to four explanatory variables. These are the reciprocal of the system's number of subscribers, the log of the total number of channels offered on all basic tiers, the log of the total number of satellite channels offered on a system, and a "dummy" or dichotomous variable set equal to one when the system meets the Act's definition of effective competition. The FCC estimates that form the basis of the benchmark prices are reported in Table 1.

As shown by the Model I's (the FCC's original model) coefficient estimates, the average per channel fees were found to be negatively related to the size of the system, positively related to the number of satellite

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estimating equation cannot be taken as a reliable index of the effects of competition.

programming services carried on the system, and negatively related to the total number of channels carried by the system.[4] Most interesting from a policy perspective is the estimated effect of being in an effective competition situation. On average, systems with direct head-to-head competition and Low Penetration Systems have, by the FCC analysis, cable rates that are each about 9 % lower than the rest of the industry, all things being equal. To compute a benchmark price for a system not subject to effective competition, one merely computes the predicted price for a system with the same number of subscribers and channel offerings, and then reduces that price by .094 to reflect the level of rates that would prevail if the local market were competitive as defined by the statute.

Model II reports our attempts to replicate the FCC's results in Model I as reported above. Due to rounding error (the FCC provided a version of the data that had variable values that were truncated), our estimates are not identical to the FCC's--but the differences are minimal.

In Model III, we separated the competitive sample into two groups, the overbuilds and the Low Penetration Systems. With this model, the estimated rate effect for overbuild systems is dramatically different than in Model I and the estimates suggest that overbuilds result in about a 30 % decline in average cable rates. At the same time, the rates charged by Low Penetration Systems look no different from the rates charged by the rest of the industry not subject to competition. This parallels the results reported by the FCC for its use of this equation.

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[4] The interpretation of these coefficients is not straight-forward, because similar measures of channels carried are on both sides of the equation. Thus, the estimates can be loosely interpreted to suggest that the total monthly rate per subscriber (not expressed on a per channel basis) goes up by about 12 % when the number of channels offered is doubled .

Table 1

Comparison of Models Predicting

Basic Rates Per Channel

	Model I	Model II	Model III	Model IV	Model V
Intercept	2.445*	2.442*	2.296*	2.279*	2.537*
Effective Comp	-0.094*	-0.094*	--	--	--
Overbuild Sample	--	--	-0.294*	-0.240*	-0.237*
Under 30%	--	--	0.050	-0.004	-0.019
1/(System Subs)	7.345*	7.356*	6.502*	5.530*	10.900*
log(channels)	-0.888*	-0.888*	-0.866*	-0.805*	-0.599*
log(satellite)	0.100*	0.101*	0.129*	0.063	-0.121
Adj. R-squared	.63	.63	.67	.75	.59

* Significant at 95 %

Model I: FCC Benchmark Model

Model II: Replication of FCC Model, Using FCC Data

Model III: FCC Model and Data, Overbuilds and Under 30% Separated

Model IV: Removal of Outliers Indicating Data Inaccuracies

Model V: Estimation of FCC Model, Using NCTA Data

However, unlike the FCC we also estimated the model after eliminating

sample observations that were identified as exerting inordinate influence on

the parameter estimates.[5]   Certain variable values for these systems were

clearly in error but still used in the FCC analysis. As a result, monthly cable

rates as high as several hundred dollars or as low as a few pennies were

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[5]About 5 % of the sample consisted of significant "outliers" having significant influence on the estimates of the model. We used standard SAS software for applying Cook's distance criterion for individual observation.   Dennis R. Cook, "Detection of Influential Observations in Linear Regression," *Technometrics*, 19, 1977.

observed. The effect of removing this erroneous information is reported as Model IV. It is noted, however, that the qualitative nature of the results is unchanged. The estimated overbuild effect remains large, but lower at 24 %. Other coefficients change more dramatically. For example, the number of satellite channels is no longer significant and the importance of the number of subscribers falls.

Finally, we reestimated the FCC model using a data set collected by the National Cable Television Association.[6] We performed this exercise both to test the reliability of the Commission's findings in Models I and II and to enable us to comfortably pursue additional analysis with the NCTA data set since it has certain advantages over the FCC data set (primarily the inclusion of several important explanatory variables). The results of the comparison are reported in Table 1 as Model V. Again, the estimates are quite similar. Most striking is the estimated effect on prices for overbuilds of 23.7%. This is close to Model IV, the model that does not utilize the portion of the sample that has obvious data discrepancies.

The larger estimated coefficient for the reciprocal of subscribers in Model V is due entirely to the greater prevalence of large systems in the NCTA data base. The restrictive functional form employed, which virtually guarantees that size economies disappear after about 1,000 subscribers,

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[6]The Commission's data set is composed of a random sample (one percent) of the approximately 30,000 U. S. cable franchises plus extra observations from franchises of the 100 largest cable systems that is combined with a sample of franchises with either overbuild competition or single system penetration of less than 30%. For the final benchmark analysis, the larger system sample was excluded. Still, because systems having multiple franchises were more likely to be drawn, larger systems were sampled more frequently than would be expected based on their numerical prevalence. Alternatively, NCTA used a stratified sample to generate its data set, with higher weights placed on larger systems to ensure that they were sufficiently well represented in the data to make estimates of system size effects reliable for large systems. So, both procedures produced data sets in which large systems are over represented relative to their prevalence in the general population of cable systems.

evidently introduces some degree of statistical bias, primarily affecting smaller firms (but not the smallest ones).[7]

III. Implications of the FCC Methodology for Rate Benchmarks

In this section, we will discuss an important flaw in the underlying FCC methodology that seems to have led to benchmark levels that are inappropriately low. First, we will demonstrate that systems in overbuild situations are systematically different from all other franchises. These differences have nothing to do with the absence or presence of competition. This poses an econometric challenge because, unless the statistical model adequately takes such factors into account, differences in prices between overbuild franchises and other systems will be incorrectly attributed to the effect of overbuild competition. Because the FCC models do not account for such factors, there is strong reason to believe that the effects of competition are consequently overstated.[8]

A. Overestimating the Effects of Competition

The models employed by the FCC ignore potentially important factors affecting cable system prices. For example, there are no included variables which can accurately reflect factors known to affect cost (e.g., wage rates, utility taxes, population density). In addition, many of the omitted factors are highly correlated with the presence or absence of overbuild competition

Table 2

Comparison of Random Sample with Franchise Overbuilds

Franchise Characteristic	Random Sample	Overbuilds
Franchise Subscribers	3,148	4,676
System Subscribers	21,681	20,266
Systems > 20,000 Subs	24%	32%
Average Fees per Channel	.88	.53
Total Channels on Basic	29	38
Satellite Channels on Basic	18	24
Pay Channels	4	5
Churn (percent of subs)	53%	43%
Miles of Plant	66	177
Required to Bury Cable	19%	7%
Headend age :		
Under 6 years	24%	30%
Over 19 years	13%	20%
Basic Revenue % of Total	61%	53%
Located in South	30%	54%
Located in Pacific or Mountain State	28%	3%
6 or more Off-Air TV Signals	41%	71%
Member of large MSO (100 or more systems)	45%	24%

There are significant differences between the random sample and the

than the random sample mean of .88. Much of this difference might be explained, however, by the larger number of basic channels (and, therefore, the ability to provide more program services on overbuild systems). The average overbuild carries an average of 38 channels, 24 of which are cable networks (i.e., delivered via satellite). The numbers are 29 and 18 for the average system in the random sample. In other words, the overbuilds provide over 30 percent more program services.[9]

It is worth noting that, for the industry as a whole, about 60% of the observed variation in price per channel can be explained by differences in the number of channels offered. The FCC models explain from 63 to 67 percent of total variation, but very little of the remaining variation is explained by other factors. This suggests that the FCC model does not adequately explain the variation in monthly cable bills and that the respectable performances (e.g., as indicated by the R-squared statistic) of simple models explaining price *per channel* are somewhat misleading[10]. This implies that the models do not capture as much of the real world factors affecting price as one would like to have for policy analysis.

Overbuild Systems have more premium channels (not reported in Table 2), have more advertising revenue, more pay-per-view channels, and are more likely to have one and two-way addressability than systems in the FCC's

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[9]One might argue that the overbuild franchises carry more programming precisely because they are more competitive. However, this may well not be be the case. Our preliminary look at the evidence indicates that system age, to a large extent, dictates channel capacity. Capacity, not competition, appears to be the driving factor behind the number of channels provided.

[10]In fact, when one retains the basic structure of the FCC model and estimates the monthly rate as a function of satellite channels, total basic offerings and the reciprocal of subscribers, one gets almost identical results, but the R^2 falls to about .12. This is not necessarily a fatal flaw but it does indicate that extra caution in interpreting the estimates of variables that might be correlated with left-out variables, such as whether or not the system is an overbuild, is required.

random sample. Consequently, in general. Overbuild Systems rely less on

basic revenue than do non-overbuild systems. For example, in the overbuild

sample 53 percent of a system's revenue comes from cable fees for basic tiers

(excluding equipment rental, installation, etc.). This figure is significantly

higher at 61 percent for the representative sample.

This differential in dependence on basic revenue is probably driven by

the fact that technological capabilities (pay-per-view, fiber, addressability,

and local and commercial insertions are more generally found in overbuild

systems). This has predictable consequences for basic cable rates because

Overbuild Systems, with access to relatively higher ancillary revenue from

subscribers (this is true even if all revenue streams are reduced by

competition), will try to gain access to that revenue by keeping basic prices

relatively low.[11] Any model that ignores this difference between overbuilds

and the rest of the industry is likely to overstate the competitive effect.

This technology-driven difference in pricing most likely stems from

the contrasting distributions of headend age for the random versus the

overbuild sample. As Table 2 reports, overbuilds are more likely to be 5-years

old or younger. In addition, 20 % of the overbuild sample, compared with 13 %

for the random sample, have headends that are 20 or more years old and are

likely to be rebuilt sooner than others. If new or rebuilt systems start out

with lower rates to achieve a threshold of penetration, or to gain consumer

acceptance or overcome an established incumbant, simple models that ignore

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[11]It is instructive to look at other industries to illustrate this point. In the
newspaper industry, when *USA Today* failed to make inroads into national
advertising markets (arguably because of rigorous competition with
alternative national media with greater household penetration) the
subscription price was increased. On the other hand, most daily newspapers,
especially those with relatively more market power in the local advertising
market, charge subscription prices that may not even cover the cost of the
newsprint.

such dynamics could very well overstate the long-run equilibrium effect on prices of overbuild competition.

In addition, overbuilds are much more likely to be located in the South (over 54% compared with 30 % for the random sample), with notably lower costs than other regions. On the other hand, 28% of the industry's systems are located in the higher cost Pacific or Mountain regions while only 3 % of the Overbuild Systems are located in these high-cost parts of the country. Consumers in these Western regions also appear to use the mass media less intensely than their counterparts elsewhere.

Finally, 41 percent of the industry's systems are located in communities that receive at least 6 television signals over the air (previously determined by the FCC to provide effective competition to cable).[12] In contrast, fully 71 percent of the nation's Overbuild Systems are in markets where consumers have free access to what the FCC used to consider effective competition. In fact, previous work suggests that price per channel falls by 12 percent where 6 over-the-air signals exist.[13] Since 30 percent more of the overbuild markets have such over-the-air competition, it would seem that the FCC's omission of the variables reflecting this competition from its model might inappropriately add 4% (30% of 12) to the estimate of the effect of overbuilds on pricing.

Although it is not possible to prove a priori , this discussion suggests that the omitted variables identified above are likely to overstate the estimated effect of overbuilds on pricing and consequently the FCC's study appears to result in an unreasonable competitive standard. While it does have some of the requisite measures, the FCC data base does not include enough information

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[12]Although the FCC data base does not provide information on broadcast alternatives to cable, deriving an industry estimate was made possible by using the NCTA data base and reweighting appropriately for sample comparability.
[13]James N. Dertouzos and Steven S. Wildman, "Competitive Effects of Broadcast Signals on Cable," February 22, 1990.

for testing the severity of the bias we have identified. However, the NCTA data

base is more comprehensive and we hope to conduct a more thorough

investigation in the near future.

B. Preliminary Results on the Effects of Competition on Cable Systems

In Table 3, we report some preliminary regression results explaining basic cable prices (on the lowest tier), subscribers, and total channels carried on basic tiers.[14] These models estimate the relationships between these outcome measures (in log-linear form) and a variety of exogenous market and system characteristics, including households, median household income, region of the country, and channel capacity. Also included are other measures of competition, including whether the system faced six over-the-air television signals[15] or direct overbuild competition in the local market.

Although the results are not directly comparable with the FCC benchmark results, they do cast significant doubt on the conclusion that overbuild competition can affect cable rates by as much as 30 percent or more. In particular, our study indicates that overbuild competition appears to reduce the price of the lowest tier of cable programming by 7 percent (though this result is not significant at the 95% level of confidence). In addition, the number of basic tier channels is about 5 % higher for an Overbuild System, all other things being equal.[16] Taken together, these two effects represent about

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[14]The FCC's analysis focused on average revenues per channel per subscriber, including revenues from all basic tiers, equipment rentals, and related services. We believe that more information is obtained when one looks separately at the separate business decisions that affect average revenues per channel per subsciber. In other words, we looked at first tier basic prices, the number of channel offerings, and subscribers.

[15]In this analysis, we analyze a dichotomous variable indicating the presence of at least six off the air television stations. This cutoff represents the most recent standards for effective competition based on broadcast signal availability.

[16]Recall from Table 2 that Overbuild Systems averaged 38 channels while the FCC's random sample averaged 29 channels, a 31% difference. However, once one controls for other factors, most notably channel capacity, the difference is only 5 percent. In other words, only 5 of the 31 percent can be interpreted as being the result of overbuild competition. The rest is due to factors not taken into account by the FCC models.

a 12 percent rise that is significantly different from zero. The effect on the number of cable subscribers is significant as well. An Overbuild System will generally have about 14 percent fewer subscribers than other systems, all things equal.

Even more provocative is the finding that over-the-air television seems to have a competitive effect that is similar to the effect due to the presence of overbuild competition. For the three measures of cable pricing, number of subscribers, and number of channels on a system, changes due to the presence of six over-the-air (OTA) signals is about the same as the response to direct overbuild competition. In addition, our study provides estimates for a regression adding an interaction term representing the simultaneous presence of both types of competitors (overbuilds and six over-the-air signals). The results are reported in the third column of Table 3. The separate coefficients on the OTA and overbuild variables represent the changes that occur when only one of the two types of competition exists in the market. In each instance the subscriber declines are both nearly 30 percent. In contrast, when one type of competition already exists, the marginal effect of adding more is not significant.

This result bears further scrutiny. This strongly suggests that while the economic value of overbuild competition can be quite high, the effects only occur when there does not already exist effective competition in the form of six over-the-air signals. This is a very critical issue which must be further explored.

Table 3

Competition and Cable System Outcomes:

An Analysis of the NCTA Data Set

	Dependent Variable, Log of:			
	Lowest Tier Price	Total Basic Subscribers	Total Basic Subscribers	Total Basic Channels
Intercept	2.346	-1.113	-1.122	-0.086
log(households)	-0.078*	1.007*	1.019*	0.079*
log(income)	-0.066	0.067	0.141	0.038
log(head end age)	0.043	-0.018	0.008	0.0002
MSO > 1 million subs	-0.132	0.020	0.057	0.006
6 or more OTA TV	-0.070	-0.141*	-0.292*	0.052
Overbuild Competition	-0.078	-0.149*	-0.261*	0.049
Simultaneous Overbuild and OTA Competition	--	--	-0.224*	--
R^2	.25	.98	.98	.81

Regression models also controlled for regions and channel capacity

IV.   Implications of the FCC's Original Benchmark for the Cable Industry

In this section, we describe some of the likely implications of the FCC

benchmark methodology for cable systems. We will demonstrate that, even

assuming an accurate assessment of a competitive overbuild effect (an

assumption we believe is unwarranted), the FCC's methodology produced

benchmarks that are too low given factors affecting cost for most cable

systems and that are biased against companies having particular

characteristics and/or which are located in certain regions of the country.[17]

A well-known statistical property of log-linear models such as the FCC's

is that they do not provide straightforward estimates of the absolute levels of

the variables they are used to predict.[18] In most instances, there is a bias that

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[17]Although we emphasize these two particular biases in our discussion, we do
not mean to imply that there are no other biases of equal importance. In
particular, we have already mentioned that the results are rather sensitive to
the presence of data anomalies. In addition, we found the estimated effects to
be quite sensitive to functional form. For example, using the average
channels per subscriber rather than the total channels available as an
explanatory variable changes the results. Finally, since the measures of
subscribers and the number of program offerings are endogenous outcomes
that are affected by the presence of competition, the estimates are going to be
polluted by simultaneous equation bias. Although we did not have the time to
pursue the implications of these issues in great detail, preliminary results
suggest that there are likely to be problems, particularly in terms of variation
in the benchmark intended to reflect variation in the circumstances faced by
different cable systems.

[18]This can be seen in a simple arithmetic example. Presume that a study is
interested in an economic outcome such as the monthly price of cable
television and is using a statistical model that predicts the logarithm of price.
If there are two system prices in the market, one charging $30 and the other
$20, the average is $25. In a more sophisticated way, a regression-based
benchmark is really only a sample average, standardizing for other factors
related to price. If the model yields predictions for the log of price, a perfect
model would yield: log(20) and log(30) or 3.00 and 3.40, for an average of 3.20.
Transforming back to get a prediction for the price levels is done by taking
the exp[log(X)] = X, or exp(3.20) which is equal to 24.53. Thus, the sample
average is understated by about two percent. The bias is correctable in a
regression framework.
Under circumstances where there is no systematic relationship between the
regression errors (where the error is given by the actual minus the predicted
value of the cable rate per channel), the correct multiplicative transformation
to obtain unbiased estimates of the levels from a log-linear specification is the

can be removed with a simple correction (the average of the exponentiated regression errors). The FCC made no correction even though, for the FCC model and data, we computed that this corrective factor should have been 1.036. This implies that the mean sample prediction would have to be inflated by almost 4 percent to get benchmark levels that accurately reflect industry price levels in the absence of competition. The resulting price levels are then adjusted downward to reflect the rates that are presumed to prevail in a competitive situation.

To illustrate this bias and the nature of the correction, our study generated individual predictions for each of the firms in the FCC's random sample of firms. Table 4 summarizes the calculation generated by substituting sample values into the FCC regression equation and then taking the exponential of the prediction of the log. This represents the FCC methodology for computing benchmarks for individual franchises. The average of these predictions is 85 cents per channel, while the true average for the sample is 88 cents. The average prediction of 85 cents, when reduced by the estimated competitive effect (about ten percent), in the FCC's current proposal, yields a rate target of 77 cents per channel. Since the FCC methodology does not make the required correction, this would represent about a 13 % rollback, not the intended 10 % reduction for a typical cable franchise not subject to overbuild competition.

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mean of the exponentiated residuals. See Naihua Duan, "Smearing Estimate: A Nonparametric Retransformation Method," *Journal of the American Statistical Association*, September 1983.

Table 4

Comparing FCC Benchmarks with
Actual Cable Industry Rates
(Average Firm Values $)

	Cable Rates, Actual and Predicted[a]
Actual per Channel Rates	.88
Benchmark Based on 10% Reduction From Actual Price	.79
Mean Prediction from FCC Model	.85
Benchmark Based on 10% Reduction: From FCC Prediction	.77

[a] Calculated from FCC weighted Average Formula

Given our calculation of the benchmarks which indicates that the

rollback is 30 % greater than thought, we evaluate more accurately the